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THE STUDY OF CERTAIN BLOOD INDICES DURING LONG-TERM ADMINISTRATION OF VANADYL SULFATE

[Izucheniye nekotorykh pokazateley krovi pri dlitel'nom vvedenii vanadil-sul'fata]

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Trudy Voronezhskoga (Gosudarstvennogo) Meditsinskogo Instituta, pp. 65-68.

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THE STUDY OF CERTAIN BLOOD INDICES DURING LONG-TERM ADMINISTRATION OF VANADYL SULFATE

L. M. Kopylova

The experiment was performed on 15 rabbits weighing 1.6 - 2.2 kg. The solution of vanadyl sulfate was prepared from spectrally pure salt, and was administered 30 times to the animals, subcutaneously, during the day for 2 months, in the amount of 1 mg/kg of weight. Simultaneously, the group of control animals was administered the same volume of an isotonic sodium chloride solution prepared from spectrally pure salt.

In order to estimate the toxic effect of the preparation during multiple long-term administration, special investigations were made: there was a general analysis of the blood, blood cholesterol, and β-lipoproteins. Moreover, 15 amino acids and protein fractions of the blood were investigated in 8 rabbits.

All of the investigations were made in dynamics. During clinical observation, the behavior of the animals and outward appearance was no different from the control animals, and there were no disruptions of function of the gastrointestinal tract.

During the administration of vanadyl sulfate subcutaneously to the rabbits, the numerical content of erythrocytes increased as early as 2 weeks after dosage.

TABLE 1. CHANGE IN THE NUMBER OF ERYTHROCYTES, LEUCOCYTES, AND HEMOGLOBIN OF THE BLOOD DURING THE ADMINISTRATION OF VANADYL SULFATE

Time of observation	Number of Investigations	Erythrocytes, leucocytes	Hemoglobin
Before the experiment	15	3650000/8200	60±2,36
2 weeks	12	3860000/7800	67±1,9
1 month	11	3750000/7900	67±2,57
2 months	10	3740000/8400	68±1,3
One month after terminating vanadyl sulfate administration	4	3700000/8000	66±1,9

Additionally, a statistically reliable increase in blood hemoglobin was noted both during the experiment and a month after terminating the administration of the preparation, which indicates quite pronounced stability of this effect. The investigations of the white blood showed no fundamental difference in the data between the animals administered vanadyl sulfate and the control animals.

As Table 2 shows, the amount of cholesterol of the blood in the animals decreased as early as 2 weeks after the administration of vanadyl sulfate, and held firm at approximately the same level throughout the entire experiment. During the investigation of β-lipoproteins of the blood, the author noted no determinable principle in the experimental animals.

TABLE 2. CONTENT OF BLOOD CHOLESTEROL AND β-LIPOPROTEINS IN RABBITS DURING THE ADMINISTRATION OF VANADYL SULFATE

Stages of the investigation	No. of Animals	Cholesterol, M±m	β-lipoproteins, M±m
Before administering vanadyl sulfate	15	80±5,6	110±17,4
Administration of vanadyl sulfate for two weeks	12	45±3,5	116±9,0
1 month	12	45±4,5	101±13,9
2 months	12	46±2,9	105±14,6

TABLE 3. CHANGE IN THE CONTENT OF FREE AMINO ACIDS OF THE BLOOD SERUM DURING THE ADMINISTRATION OF VANADYL SULFATE

Amino acids	Before administering preparation	Administration of vanadyl sulfate	
		1 mo	2 mos
Lysine	2,04	2,11	2,09
Histidine	4,3	3,5	3,82
Arginine	2,86	2,62	2,46
Aspartic acid	3,1	3,6	2,6
Serine	4,6	4,5	4,2
Amino acetic acid	4,0	3,59	4,6
Glutamic acid	4,0	3,4	3,4
Threonine	2,4	2,0	1,94
Alanine	3,7	3,75	3,9
Proline	4,35	4,05	3,4
Tyrosine	1,66	1,45	1,25
Methiosine	0,78	1,05	0,72
Valine	1,34	1,63	0,93
Phenylalanine	3,1	3,43	2,56
Leucine	1,74	1,5	1,6

Analysis of the amino acids of the blood serum was made using the method of distribution ascending paper chromatography, and is given in Table 3.

The mean values of the content of free amino acids in the blood serum during the administration of small amounts of vanadyl sulfate do not cause disorders of the amino acid equilibrium.

No significant changes were noted with respect to the protein fraction of the blood.

Hence, the experiment confirmed the hemostimulating effect of vanadium — an increase in the number of erythrocytes and hemoglobin. A pronounced shift was noted with respect to cholesterol. Blood cholesterol reliably decreases, which is in agreement with a number of data of the literature. No characteristic changes were found with respect to β-lipoprotiens, the content of free amino acids, and the protein fractions.

The study of small doses of vanadium during long-term multiple administration to the animals showed that a dose of 1 mg/kg of weight is not toxic.

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